Coarse-grained to very

coarse-grained rock with

syenogabbro pegmatite

near Gold Hill. Con-

biotite phenocrysts

tains large poikilitic

Fine- to coarse-grained

of pyroxene

highly porphyritic rock

with large phenocrysts

Gravel, sand, silt, and clay Qa, alluvium, colluvium, and bog deposits Qc, colluvium Qls, landslide deposits Qt, terrace gravel, partly modified by wind erosion; studded with wind-faceted stones Bog and swamp deposits and colluvium (ventifacts) Glacial moraine Alluvial deposits Part may be correlative of the Tertiary basin deposits of the Divide Valley; part probably is of Alluvial and lacustrina deposits pluvial origin and Pleistocene age. Locally re-Intermontane basin deposits in the Divide Valley. ferred to as "granite wash" Coarse blocks, boulders, sand, silt, and clay, with admixture of ash, and some pure ash beds. In places heavily mentled with coarse residual deposits resulting from erosion of finer matrix Tdm, breccia and conglowerate lens, probably of mudflow origin Tlu Upper lava unit Tlv Vitrophyre unit (Not mapped in this quadrangle) T11 Porphyritic quartz latite and related intrusive rocks Lover leve unit Probably correlatives of rocks of the second eruptive cycle of the Lowland Creek Volcanics Tlb Breccia and agglomerate unit Tlw Welded tuff unit Tlt Rasal unit of sandstone and tuff ROCKS IN SATELLITIC BODIES ROCKS OF THE BOULDER BATHOLITH Age relations with rocks of the Boulder batholith uncertain Aplite, alaskite, pegmatite, and related felsic rocks Dikes, sheets, and irregular bodies Fina-grained leucocratic quartz monzonite in dike northwest of Moose cutting quartz monzonite. All unlabelled lines in the batholith are Creek stock these felsic rocks Quartz monzonite of the Moose Creek stock Hybrid rock Medium- to coarse-grained rock with Resulting from interaction of quartz conspicuous phenocrysts of quartz monzonite and aplite and related and potassium-feldspar. Most is Quartz monzonite of felsic rocks Moosetown stock leucocratic and weathers to a qm, medium-grained biotite quartz moncrumbly and granular surface. Locally cut by dikes and irregular zonite fvp pqm, facies with abundant phenocrysts small bodies of quartz porphyry of potassium feldspar Laucocratic quartz monzonite fqm, fine-grained leucocratic facies Fine-grained, generally highly porphy-ritic rock in dikes, sheets, and with aplitic groundmass irregular bodies cutting the granite (gr) and very porphyritic quartz Xenolith-free quartz monzonite monsonite (vp) Medium- to fine-grained light-bluishgray rock Granite and leucocratic Xenolith-rich quartz monsonite Quartz monzonite quartz monzonite Small satellitic bodies whose correand granodiorite Medium- to coarse-grained rock with Medium- to fine-grained rock with lation is uncertain conspicuous irregular and round abundant large and small inclusions quartz phenocrysts; ranges widely in texture. In some places cuts of dioritic rock, probably metavolthe very porphyritic quartz monnite (vp) and in other places grades into it Very porphyritic quartz monzonite Medium- to coarse-grained rock with 20 to 50 conspicuous phenocrysts of K-feldspar per square foot of exposure el clp Butte Quartz Monzonite cl, coarse-grained light-colored variety clp, coarse-grained light-colored variety with 10 to 20 conspicuous phenocrysts per square foot of exposure Granodiorite 1d-/ Lamprophyre diatreme Cuts granodiorite east of Burton Park Syenogabbro Diorite

Fine- to medium-grained

Granodiorite of Burton Park

Medium-grained bluish-gray rock with

poikilitic biotite phenocrysts

rock as dikes and plugs

hornfels, marble, tactite, and related rocks Elkhorn Mountains Volcanics Basaltic and andesitic intrusive rocks Kc Colorado Formation Kootenai Formation mb, limestone (marble) beds near top of formation locally mapped as key beds cg, chert-pebble conglomerate locally mapped as key bed Jurassic strata, undivided Phosphoria Formation Ppg, quartzite member, locally mapped separately Pq Quadrant Formation PMa Ausden Formation Mission Canyon Limestone Mlp Lodgepole Limestone MDt Three Forks Formation Dj Jefferson Formation DOm Maywood and Red Lion Formations Marble Jefferson or **Opi** Pilgrim Formation. undivided. Isolated Pilgrim Dolomite masses of meta-dolomite north of Moose Creek **Cpa** Park Shale -Om Meagher Limestone Ow Wolsey Formation ££ Flathead Sandstone May include some Precambrian quartzite at base Laminated impure dolomite of Gold Hill Equivalent to the Helens Dolomite perhaps the upper part of the Empire Formation p€s Siltstone and argillite of Red Mountain Equivalent to the Spokane and Greyson Formations

Near the batholith and its satellitic bodies, all prebatholith rocks have been metamorphosed to granulitic rocks, EXPLANATION TO ACCOMPANY

OPEN-FILE MAPS OF BUTTE SOUTH QUADRANGLE, MONTANA

Harry W. Smedes

1967

Hornfels, undivided

dol-O

Inclusions in plutonic rocks
ls, calcite marble
dol, dolomite marble
Dots, granulitic rock and hornfels

Tacite

Metalliferous quartz veins
Dashed where approximately located

Contact
Dashed where approximately located; dotted where concealed

0 = -:

Steep fault

Dashed where approximately located; queried where inferred, dotted where concealed. U, upthrown side; D, downthrown side; arrows indicate relative movement

Thrust fault

Dashed where approximately located. Barbs on side of upper plate. Closed area represents klippe

Lineament
Plotted from aerial photographs
Interpreted as faults or
fracture zones

Sinkholes

Developed in the Meagher Formation
across the upper part of Moose Creek

Zone of brecciated rock

Anticline, showing direction of plunge

Syncline, showing direction of plunge

Generalized zone of tight folds, showing plunge

15

Strike and dip of bads

Strike and dip of overturned beds

Horizontal bads

60 75 62 70 D A A A A A A

Poliation in plutonic igneous rocks

Double barb indicates vertical foliation

Solid symbol indicates homogeneous foliation of plagioclase and mafic minerals

Open symbol indicates foliation marked only by potasium feldspar or by other minerals, but only in streaky zones, not homogene-

ously distributed through the rocks
Arrow indicates direction and amount of plunge of lineation marked by hornblende and (or) inclusions

• +

Vertical lineation in plutonic igneous rocks

Double arrow shown where lineation is superimposed on vertical foliation

A A ~

Flow banding in lava
Double barb indicates vertical banding; wavy strike line, overall trend of sinuous banding

Direction of movement of lava

Normal to axes of overturned flow folds

82 70 A

Joints and sets of joints

Double box indicates vertical joint

Mine sheft
Circle indicates caved or flooded sheft

Adit

Tick indicates adit caved, flooded, or otherwise inaccessible

This map is preliminary and has not been edited or reviewed for conformity with U. S. Geological Survey standards and nomenclature.

This map is preliment to the rest of section of the section of the